

Claim 1 recites the limitation “the first carrier material” in line 8

To ensure absolute compatibility with information given in the description, the wording has been changed to “the first molten carrier material”. This alteration is shown in the marked-up copy and in the clean copy of Amended Claims. [0006] introduces the concept of a metal oxide to metal by forcibly circulating a molten carrier material in a closed loop path serially through a charge reduction zone on one arm of the loop, a combined melt desulphurisation zone and post combustion or heating zone on the other. This encapsulates the general principle of melt circulation as envisaged by the applicant in the invention.

[0007] draws attention to the fact that the molten carrier material is not involved in a major extent in the reduction process but is there to transport the charge and reaction products in the solid state. This is a totally new concept so due attention is given to this feature in the description of the invention to ensure that the content is fully understood by the reader. In the applicant’s opinion, this aspect is a major component to what is being claimed as inventive.

[0038] in relation to Fig. 1, explains how the molten carrier material under discussion features in propelling or projecting solid material (metallised raft) floating on a surface of the molten carrier material in the first hearth A into the first refining loop B. Again this is a totally new concept so the applicant attempted to make sure that this important aspect of the invention is fully understood.

Claim 1 recites the limitation “the charge layer” in line 17

To ensure absolute compatibility with information given in the description, the wording has been changed to “the floating charge layer”. This alteration is shown in the marked-up copy and in the clean copy of amended claims. There is a major difficulty in existing smelting reduction technology in that iron ore fines are blown off solid charge material if combustion occurs above the charge material to cause difficulty with accretion formation, requiring period removal. The steps taken in [0012] are inventive and rely on the floating charge layer undergoing progressive sintering as floats down the melt circulation arm from the relatively cool conditions existing at the charge end to hotter conditions where the roof temperature approaches the melting point of metallic oxide associated with the tower. Very importantly [0012] states that an open structure remains in the floating charge layer, which permits coal volatiles and reaction product gases to be freely released into the top gas space. Further elaboration of this particular aspect involving the floating charge layer is given in [0013].

The reasons why a very thin layer of deposited solids is not favoured are given in [0016], whereas a floating charge layer in the region of 5-10 cm thick effectively blankets the surface of the molten carrier material, which in combination with a frozen crust on the underneath side of the floating charge layer slows down vigorous reduction until the material at the interface reaches a temperature of 1100°C or so, by which time the solids have been given the opportunity to consolidate to some extent. Again this is a totally new and inventive approach which is highlighted in [0016] to ensure that this aspect relating to the floating charge layer is fully comprehended by the reader.

Another important aspect relates to the prevention of melting the floating charge layer is stressed in [0019] to reinforce the novelty of what is being proposed in comparison with existing technology.

[0038] and discussion reinforces the inventive significance of the floating charge layer ultimately becoming an agglomerated solid structure referred to as “the metallised raft” as it progresses downstream in the first hearth 1.

Claim 1 recites the limitation “the reduction arm” in line 18

To ensure absolute compatibility with information given in the description, the wording has been changed to “the charge reduction zone on one arm”. This alteration is shown in the marked-up copy and in the clean copy of amended claims. From what has already been described in the above reference, the unique importance of the charge reduction zone on one arm of the loop must surely by now be self-evident, but to reinforce the argument [0007] refers to a chemical reaction front moving through the layer commencing with solid material submerged in the molten carrier material on the underneath side of the deposited layer and then as heat is conducted into the layer, the reaction front progressively moves upward through the layer as it floats along the arm on the molten carrier material. In the absence of melt circulation, as in current technology, clearly this would not be given the same opportunity to take place, again emphasising the inventiveness of this aspect of the disclosure.

Claim 1 recites the limitation “the second carrier material” in line 25

To ensure absolute compatibility with information given in the description the wording, has been changed to “the second molten carrier material”. This alteration is shown in the marked-up copy and in the clean copy of amended claims. The second molten material is defined in [0023].

The inventive concept here is clearly distinguishable by the statement given in the description [0023] “...to ensure unimpeded continuous transference of a metallised raft onto the surface of a second molten carrier material being circulated in a closed loop path serially through a top blown/flame impingement shown in order to.... and so on to the end of paragraph [0023]. In view of what has been stated, the applicant cannot comprehend the Examiner’s assertion “that there is sufficient antecedent basis for this limitation in the claim.”

Claim 1 recites the limitation “the metallised raft” in line 27

With regard to the metallised raft, there are many detailed explanations concerning the vital relevance of the metallised raft to the inventive contributions. The individual matters are described in [0008], [0018], [0022], [0023], [0024], [0038] and Fig 1. If the Examiner is not satisfied, the applicant is prepared to provide chapter and verse explanations on each of these examples.

Claim 1 recites the limitation “a metallised raft” in line 30. It is not clear if this raft is the same as in line 27.

There is only one metallised raft so the wording is changed to the metallised raft in step (iv) claim 1.

Claim 1 recites the limitation “the gaseous oxygen mixture” in line 38

To ensure absolute compatibility with information given in the description, the wording has been changed to “the gaseous oxidant”. This alteration is shown in the marked-up copy and in the clean copy of amended claims. See [0057] for a description of what is meant by this term in the present context.

Claim 5 recites the limitation “the composite charge added in step (iii)” in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim since the composite charge is added in step (i).

Yes, an error was made. The alteration is shown in the marked-up copy and in the clean copy of amended claims.

Claim 11 recites the limitation “the carbon monoxide produced in step (iv)” in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim since the composite charge is added in step (ii).

Yes, an error was made. The alteration is shown in the marked-up copy and in the clean copy of amended claims.

Claim 12 recites the limitation “hot gas clean up is effected between steps (iv) and (viii).” However, applicant has since changed these steps to (ii) and (vii). It is not clear if this step still occurs at the claimed steps.

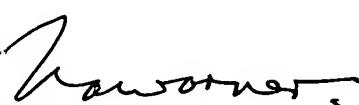
Yes, an error was made. The alteration is shown in the marked-up copy and in the clean copy of amended claims.

Claim 15 recites the limitation “the refining loop” in line 2. There is insufficient antecedent basis for this limitation in the claim since the refining loop does not occur in step (vii).

Yes, an error was made. The alteration is shown in the marked-up copy and in the clean copy of amended claims. The refining loops are more fully described in [0025].

Finally, I was pleased to note the claims are free from prior art rejections. Many thanks for your perseverance in this matter.

Yours sincerely



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Encs